COVER SHEET

DIAGNOSTIC VALUE OF ROUTINE DRAIN TIP CULTURE IN PRIMARY JOINT ARTHROPLASTY

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Key Words: Drain; Arthroplasty; Primary; Infection; Culture

Abbreviations: THA, Total Hip Arthroplasty; TKA, Total Knee Arthroplasty; PMMA, Polymethylmethacrylate.

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ABSTRACT

Background: Closed suction drainage after joint arthroplasty is common practice in many institutions. The purpose of this study is to determine the correlation between routine drain tip culture and the diagnosis of superficial or deep postoperative wound infection after primary knee and hip replacement.

Methods: Over a 12 month period, drain tips were retrieved and cultured in all patients who underwent unilateral primary total knee or hip replacement with the use of closed suction drainage. 393 cultures were performed in 387 patients (145 hip replacements, 242 knee replacements). Patients were followed for an average of 8.9 months post surgery to assess for postoperative wound infection.

Results: 3 patients had a positive drain tip culture, none of which were diagnosed with superficial or deep infection. 4 (1%) Patients were diagnosed with deep infection, 16 (4.1%) with superficial infection. No patient with either superficial or deep infection had a positive drain tip culture after their index procedure. The sensitivity of routine drain tip culture for the diagnosis of postoperative infection in primary joint replacement was 0% and specificity was 99.2%.

Conclusions: This data does not support the practice of routine drain tip culture after primary hip or knee replacement for the diagnosis of postoperative infection.

INTRODUCTION

Closed suction drainage after joint arthroplasty is common practice in many institutions. Bacterial colonisation of the drain track via retrograde migration increases as long as the drain remains in situ, particularly beyond 24 hours. [1, 2, 3, 4] As volumes collected in closed suction drains after total joint arthroplasty are minimal after 24 hours, many surgeons remove drains early to reduce the risk of wound contamination. [1, 2]

In our institution, primary joint replacements managed with closed suction drainage routinely have their drains removed prior to 24 hours after surgery, and patients also receive antibiotic prophylaxis while the drain is in situ. Surgical wound infection screening for many years in our institution has included culture of all drain tips removed after routine joint arthroplasty. The purpose of this study is to assess the validity of this practice by establishing the diagnostic value of routine drain tip culture for the diagnosis of wound infection after primary knee and hip replacement.

METHODS

All patients undertaking unilateral primary total hip or knee replacement at the Prince Charles Hospital between Jan 2003 and Dec 2003 were identified retrospectively by discharge diagnosis coding and the hospital arthroplasty register (Orthowave). 387 patients (393 drains) were managed with closed suction drainage and were included in the study. 145 patients (147 drains) had total hip arthroplasty (THA) and 242 patients (246 drains) had total knee arthroplasty (TKA).

Antibiotic prophylaxis consisted of intravenous Cephalothin 1g on induction of anaesthesia and 4 postoperative doses each separated by 6 hours. The use of antibiotic impregnated PMMA cement was according to surgeon preference, and was used in approximately 50% of cases. Closed suction drains were of minimum size 10 Fr, and brought out through skin separate from the operative incision. Routine management included removal of all drains within 24 hours of surgery. According to this protocol, all drains were removed prior to discontinuing antibiotic prophylaxis.

Drain removal was conducted using sterile technique. Utilising single use sterile scissors, the terminal segment of approximately 1cm drain tip was selected and detached for analysis. Drain tips were inoculated onto 5% sheep's blood agar using standard 16 streak technique and incubated in a 5% CO_2 chamber at 35 degrees celcius. Specimens were inspected every 24 hours for 3 days, at which time if no growth was detected the result was reported as negative. Isolates of positive drain tip cultures were referred for further identification and sensitivity testing.

Dressings were removed and inspected for signs of infection on postoperative day 4 or the day of discharge by either Orthopaedic Consultant or Registrar. Outpatient wound inspections after discharge were conducted at postoperative week 6 and at 1 year, unless the patient returned earlier with a postoperative complication. All complications including superficial and deep infections were recorded on the hospital arthroplasty register. All patients included in the study underwent a minimum postoperative follow up of 3 months, with an average duration of 8.9 months. Included in the data analysis are the 1.2% of patients lost to outpatient follow up after hospital discharge.

RESULTS

Of the 393 drain cultures performed, only 3 (0.8%) were positive. 1 drain tip isolated a Coagulase Negative Staphylococcus, and 2 yielded a mixed (>3 strains) scant growth of normal skin flora. No patient with a positive drain tip culture was diagnosed with either superficial or deep infection. Treatment for infection was not instituted in any patient on the basis of drain tip culture results as none demonstrated evidence of infection on clinical grounds.

20 patients were diagnosed with infection. 4 patients (1%) had deep prosthetic infection, which required operative management. 16 patients (4.1%) had superficial infection managed with antibiotics alone. No patient who was diagnosed with either superficial or deep infection had a positive drain tip culture after their index procedure.

The sensitivity of routine drain tip culture for the diagnosis of postoperative infection in primary joint replacement was 0% and the specificity was 99.2%.

The total financial cost to our institution in performing 393 drain tip cultures over a 12 month period was A$12 210.

DISCUSSION

Drain tips removed within 24 hours of clean orthopaedic surgery have 0 – 10.8% culture positive rate in the literature. [1, 2, 3, 4] The low rate of culture positive drain tips seen in this study may in part be due to early removal, but also due to our current practice of routine postoperative antibiotic prophylaxis while drains remain in situ.

The results of this study do not support the practice of routine drain tip culture after primary hip or knee replacement for the diagnosis of postoperative wound infection due to the poor sensitivity of the test. Continued patient assessment for the diagnosis of infection presenting beyond the time period selected for this study (minimum 3 months, average 8.9 months) was not considered necessary as this would not have significantly impacted on the demonstrated sensitivity. This institution has now discontinued the practice of drain tip screening after primary joint replacement.

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